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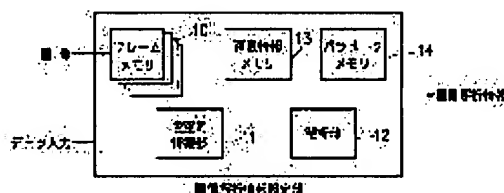
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(54) COLOR IMAGE PROCESSING UNIT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide the color image processing unit to serve properly a color conversion parameter for color conversion processing of a color image.

SOLUTION: The color image processing unit is made up of a frame memory 10, a color space information section 11, an analysis section 12, an image information memory 13, and a parameter memory 14. Then an optional image is analyzed at a point of time and analysis information is to be stored. Thus, it is not required to analyze the image for the occasion and various correction guides are obtained by having only to reference image analysis information in a direct relation. Furthermore, a parameter is selected easily afterward by adding a history of a color correction parameter to the image analysis information.



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CLAIMS

[Claim(s)]

[Claim 1] The color-picture processor characterized by to have an analysis means generate image-analysis data, and an image-information storage means to by_which said image-analysis data generated with this analysis means are stored, by image storage means to by_which image data is accumulated, color space storage means to by_which the data about a color space are stored, the color space data stored in this color space storage means, and the image data which were accumulated by said image storage means.

[Claim 2] This equipment is a color picture processor characterized by performing the inside-and-outside judging of the color reproduction range from the color reproduction range data of said output means which has a color reproduction information storage means by which the color reproduction range data of an output means by which image data is outputted in a color picture processor according to claim 1 were stored, and was accumulated in this color reproduction information storage means, and the image-analysis data analyzed with said analysis means.

[Claim 3] It is the color picture processor characterized by having the conversion means on which the image-analysis data by which said analysis means was generated with this analysis means in the color picture processor according to claim 1 or 2 are displayed with a simple expression.

[Claim 4] It is the color picture processor characterized by for this equipment having a parameter storage means by which two or more color correction parameters were accumulated, in a color picture processor given in any 1 term of claims 1-3, and for said analysis means extracting at least two candidates from said two or more color correction parameters accumulated in this parameter storage means in order of adaptation, and outputting the resolution picture by this candidate at once.

[Claim 5] It is the color picture processor characterized by adding said color correction parameter which used said analysis means once in the color picture processor given in any 1 term of claims 1-4 to said image-analysis data, and accumulating in said image information storage means.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to an image processing system, especially the color picture processor which performs processing of a color picture.

[0002]

[Description of the Prior Art] When a report was created by devices, such as the conventional color picture processor, for example, the word processor which has an edit function, or a personal computer, the color picture inserted in the report carried out color conversion each time, and was arranged on the form. Moreover, after carrying out color conversion each time not only in the case of the image inserted in but a simple substance image, it was outputted from the output unit. Furthermore, the image data by which color conversion was carried out was saved as it was in the data after color conversion in consideration of reuse at storages, such as a floppy disk.

[0003] However, in the conventional color picture processor, the parameter information when carrying out color conversion or reason information for parameter selection based on the description (distribution) of a subject-copy image was not able to be acquired.

[0004]

[Problem(s) to be Solved by the Invention] This invention cancels the conventional fault and aims at offering the color picture processor which can offer appropriately the various color conversion parameters corresponding to the image of arbitration.

[0005]

[Means for Solving the Problem] The color-picture processor of this invention has an analysis means generate image-analysis data, and an image-information storage means to by_ which the image-analysis data generated with the analysis means are stored, by image storage means to by_ which image data is accumulated, color space storage means to by_ which the data about a color space are stored, the color space data stored in the color space storage means, and the image data accumulated by the image storage means.

[0006] The color picture processor of this invention has a color reproduction information storage means by which the color reproduction range data of an output means by which image data is outputted were stored again, and performs the inside-and-outside judging of the color reproduction range from the color reproduction range data of the output means accumulated in the color reproduction information storage means, and the image-analysis data analyzed with the analysis means.

[0007] The color picture processor of this invention has the conversion means on which the image-analysis data generated with the analysis means are further displayed with a simple expression.

[0008] The color picture processor of this invention has a parameter storage means by which further two or more color correction parameters were accumulated, extracts at least two candidates from two or more color correction parameters accumulated in the parameter storage means in order of adaptation, and outputs the resolution picture by the candidate at once.

[0009] Further, the color picture processor of this invention adds the color correction parameter used

once to image-analysis data, and accumulates an analysis means in an image information storage means.

[0010]

[Embodiment of the Invention] One operation gestalt of the color picture processor by this invention is shown in drawing 1. The color picture processor of this example As a color space storage means by which the information about the frame memory 10 as an image storage means to make image data incorporate and memorize, and a color space is held As an analysis means to perform analysis and processing of the ***** information bureau 11 and an image It consists of image information memory 13 as an image information storage means by which the information outputted from ***** 12 and the analysis section 12 is accumulated, and parameter memory 14 as a parameter storage means by which various parameters are accumulated.

[0011] The flow of the color picture processor by the above-mentioned configuration is shown in drawing 2. If an image processing is started, the image data set as the object of an output will be developed by the frame memory 10 (201). A setup of an image attribute is inputted by the operator to the image data developed by the frame memory 10. As information by which a setting input is carried out, the image kind of natural image data, computer graphic image data (CG image), or business graphic image data and this look at the image with which the operator was displayed on the external display, the image data judges, and it inputs. In addition, the fundamental descriptions, such as image size, resolution, and the light source, are inputted by the operator, and these input is stored in the image information memory 13 one by one (202).

[0012] Next, image attribute information is set up (203). Explanation of an example of a setup of image attribute information chooses whether analysis is first performed per pixel, or it is made to perform per block. Although analysis precision will improve if it is made to perform per pixel "O" as shown in drawing 3, the processing time starts. On the other hand, when it is made to perform per block of mxn, although precision, such as making the pixel at the upper left of for example, each block process as representation data etc., falls, its processing speed improves. It also inputs a block size, in choosing processing in a block unit.

[0013] Next, a color space and system of coordinates are chosen. A color space shows general RGB space, XYZ space, CIELAB space, CIELUV space, HVC (Munsell) space, etc., and the analysis section 12 processes required information by reading data in the color space information bureau 11. System of coordinates mean a rectangular coordinate system ((a) of drawing 4) as shown in drawing 4, and a spherical coordinate system ((b) of drawing 4).

[0014] Selection of a color space and system of coordinates sets up the number of partitions of each shaft next. Since the color space of arbitration needs to satisfy people's sensory-area-perception region, the maximum field of the space is determined naturally. For example, the horseshoe shape space in xy chromaticity diagram corresponds to this. Here, the number of partitions is the parameter of whether to analyze the maximum field of this space in what subspace.

[0015] If the number of partitions is inputted, according to a rectangular coordinate system, by the spherical coordinate system, it will be divided into space as shown in (b) of drawing 5, and analysis will be performed to the subspace of a rectangular parallelepiped as shown in (a) of drawing 5 again.

[0016] Next, in the analysis section 12, the image information according to subspace is collected based on such information (204).

[0017] It is the ratio how much to contain per all analysis pixels of each division space where it changed into the data corresponding to the color space which had the object image chosen as image information collected, for example, and this data was shown in drawing 5 etc. Naturally in this example, the ratio sum total all computed in part space is set to 1.

[0018] Termination of storing of all the information on the image information memory 13 outputs old information to an external record medium as image-analysis information according to the format for which it opts beforehand with equipment (206).

[0019] The flow chart of other operation gestalten of the color picture processor by this invention is shown in drawing 6. The image-analysis information linked to (601) and 1 to 1 by an image outputting

being chosen is referred to (602), and the data is read into the image information memory 13 (603). Next, the output unit as output means, such as CRT or a printer, is chosen by the operator (604). All the GAMATTO profiles as a color reproduction information storage means which is the file which described the color reproduction range of an output unit and which is not illustrated are recorded on the parameter memory 14, and are recorded about all the color spaces in claim 1. In addition, the contents of the GAMATTO profile in the parameter memory 14 can be rewritten by access from the outside, and can be added.

[0020] Since the analysis section 12 can determine one color space and system of coordinates from the analysis attribute information developed by the image information memory 13, refer to the part which corresponds out of the data constellation about the output unit by which selection was made [above-mentioned] for it (605). Next, from the GAMATTO profile referred to one collection information pair according to division space, inside-and-outside analysis of an output unit is performed (606), and, finally it is outputted as image-analysis information.

[0021] Here, a GAMATTO profile and an inside-and-outside judging are explained. The flow chart of the GAMATTO profile creating method is shown in drawing 7 . The sample of a large number which satisfy all the information on the GAMATTO profile of an output unit is outputted and measured (702). It changes into each color space and each system of coordinates which support the result (703). The strange color space field in this time divides the field with which it is satisfied of people's consciousness like claim 1 by a certain number of partitions. And when the point of measurement which is more than N individual ($N \geq 1$) belongs to division space (706), "1" is given to the subspace (707), and in not existing at all, it gives "0" (708). Consequently, in division space, if data are saved in order based on a certain regulation, a GAMATTO profile will only serve as the binary data aggregate. The example which took out a certain space is shown in drawing 8 .

[0022] Below, an inside-and-outside judging is explained. Both the GAMATTO field of an output unit and the GAMATTO field analyzed to the image are in agreement in order to take people's sensory-area-perception region. here -- the number of partitions of both GAMATTO -- as for the latter, the former can be set [a manufacturer side] as GAMATTO profile creation time by the operator. That is, although it may happen also when the number of partitions is not equal, the number of bipartite rates is explained equal for simplification of explanation. In addition, the comparison is easy, if the maximum field and the number of partitions are known when the number of partitions is not equal. However, some arithmetic and a comparison are required in this case. In order to attain improvement in the speed of processing, an approach with the GAMATTO profile according to number of partitions is taken.

[0023] If analysis attribute information shows a color space and a coordinate and a GAMATTO profile is referred to based on this information, naturally the information on same color space and these system of coordinates can be referred to. Since the content ratio for every division space is contained in the analysis information on an image under the same regulation as the time of saving a GAMATTO profile, it takes out picking one by one, and if the result of "0" of the content ratio x GAMATTO profile within image-analysis information and "1" is not "0", if it is "0", a judgment will become possible easily the outside of GAMATTO in GAMATTO.

[0024] The flow chart of other operation gestalten of the color picture processor by this invention is shown in drawing 10 . Even if it outputs the image-analysis information as an analysis result of an image to the display of the exteriors, such as CRT, as it is to an operator, it will be hard to understand if there is no knowledge of a color space. Then, it transposes to a more nearly intuitive expression with the conversion means which is not illustrated based on image-analysis information in the analysis section 12, and data are sent to an external indicating equipment.

[0025] Image-analysis information is first caught in macro, and the ratio of subspace is unified from right above so that it may see from just beside, as shown in drawing 9 . Consequently, the information that it is distributed over a part for the lower part in axis3 which is three-dimension Z shaft orientations, and is distributed over the plus direction of axis2 in axis1 and axis2 is acquired (1001). The semantics which each shaft has is analyzed in the analysis section 12, the text data "many this screen to darkness and yellow is distributed" are extracted (1002), and delivery and an indicating equipment are made to

display document data on an external indicating equipment as a message as a corresponding expression from the color space of this information and analysis attribute information (1003).

[0026] furthermore -- the case where inside-and-outside information is also included -- for example, -- "- many this screen to darkness and yellow is distributed. if it outputs with a serial printer -- X % -- reappearance -- it becomes out of range. The message " can be displayed. In addition, it can ask this X% by the total of content by which the internal judging was carried out.

[0027] The flow chart of other operation gestalten about this invention is shown in drawing 11 . Based on the information (message) displayed on the above-mentioned indicating equipment, an operator will judge whether color correction is carried out. Many color correction parameters are stored in the parameter memory 14. This parameter has the function which absorbs the difference in GAMATTO (GAMATTO compression), and amends a color. It has all data according to the color space which supports equipment, system of coordinates, and number of partitions. For example, the parameter used for the eight-point interpolation of JP,58-16180,B and the six-point interpolation of JP,5-75848,A corresponds to this.

[0028] It explains based on the flow chart of drawing 11 . It is based on the information (message) displayed on the above-mentioned indicating equipment, and the operator inputs or sets up required adjustment values, such as brightness, lightness, saturation, a hue, or GAMATTO compression, (1101).

[0029] The retrieval information for referring to the parameter for which it was suitable from the parameter memory 14 in which many color correction parameters are stored is generated from the priority of the processing which accompanies next the adjustment value inputted or set up beforehand, and weighting (1102). Two or more candidates are extracted in the order which suits this information, and that parameter name is displayed on it (1103).

[0030] When it judges whether the image which carried out color conversion is outputted or displayed to a trial (1104) and carries out an output etc. to it with two or more parameters, the target image is captured (1105), the rectangle of the fixed frame displayed with an image is operated, and it is determined which part of an image is changed (1106). After frame assignment is completed, sequential conversion only of the specified part is carried out with each parameter (1107), within the magnitude of the immobilization set as arbitration as shown in drawing 12 , an resolution picture is arranged according to the layout decided beforehand, and an output or a display is performed (1108). As shown in drawing 12 , when candidates are four parameters, color conversion is carried out with the parameter with which the operator chose one parameter of hope (1109), and then the whole image was chosen (1110). In addition, in 1104, an operator performs actuation after 1109 to output or display the image which carried out color conversion with two or more parameters.

[0031] In addition, the conversion parameter name which the above-mentioned operator chose is made to add to image-analysis information. In case the message of the above-mentioned image-analysis information is displayed on a display by giving this hysteresis information, it becomes possible by giving an additional indication of the hysteresis information to make an operator choose still more easily.

[0032]

[Effect of the Invention] Since according to the color picture processor of this invention it can analyze at a certain time and analysis information can be made to hold to the image of arbitration like

[explanation / above / it is ***** and], it can consider as the guide of various amendments only by referring to the image-analysis information which it becomes unnecessary to analyze an image each time, and has the relation of 1 to 1.

[0033] Moreover, the GAMATTO inside-and-outside judging with image-analysis information and an output unit can perform at a high speed easily.

[0034] Furthermore, since image-analysis information can be offered to an operator in the format which is easy to understand, the increase in efficiency of the operator interface function to image transformation can be attained.

[0035] Furthermore, an operator can check the candidate RAMETA extracted automatically and the parameter to wish can be chosen.

[0036] Moreover, it becomes possible to perform next parameter selection easily by making the hysteresis of the parameter once used for conversion add to image-analysis information.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the functional block diagram showing the example of a configuration of the color picture processor of this invention.

[Drawing 2] It is the flow Fig. showing the example of the equipment shown in drawing 1 of this invention of operation.

[Drawing 3] It is the explanatory view showing the setting range of image analysis.

[Drawing 4] It is the explanatory view of a rectangular coordinate system and a spherical coordinate system.

[Drawing 5] It is the explanatory view of a rectangular coordinate system and a spherical coordinate system.

[Drawing 6] It is the flow Fig. showing the example of GAMATTO inside-and-outside analysis of operation.

[Drawing 7] It is the flow Fig. showing the example of the GAMATTO profile creating method of operation.

[Drawing 8] It is the explanatory view showing an example of division space.

[Drawing 9] It is the explanatory view showing an example of division space.

[Drawing 10] It is the flow Fig. showing the example of a macro-judging of image-analysis information of operation.

[Drawing 11] It is the flow Fig. showing the example of color correction parameter selection of operation.

[Drawing 12] It is the explanatory view of the example of a display in the case of color correction parameter selection.

[Description of Notations]

10 Frame Memory

11 Color Space Information Bureau

12 Analysis Section

13 Image Information Memory

14 Parameter Memory

[Translation done.]

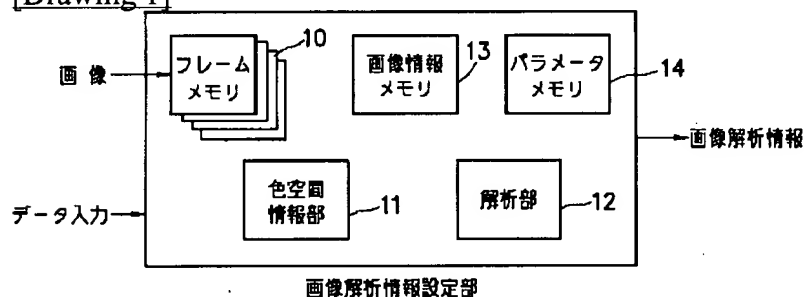
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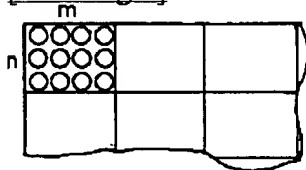
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DRAWINGS

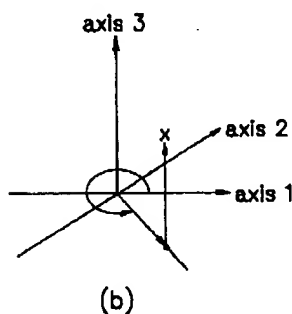
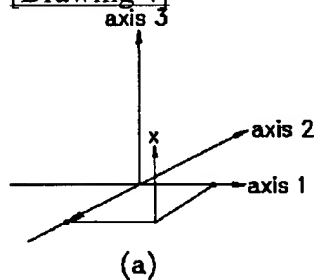
[Drawing 1]



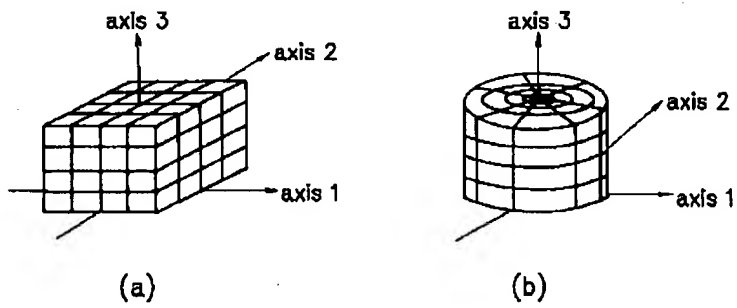
[Drawing 3]



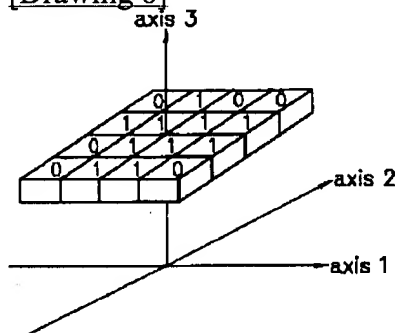
[Drawing 4]



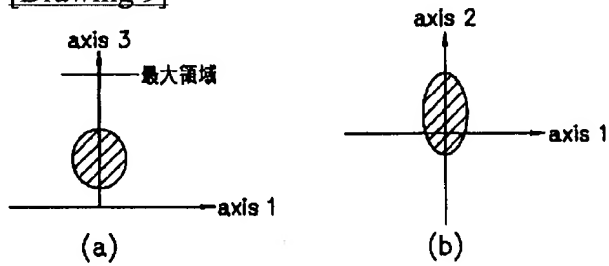
[Drawing 5]



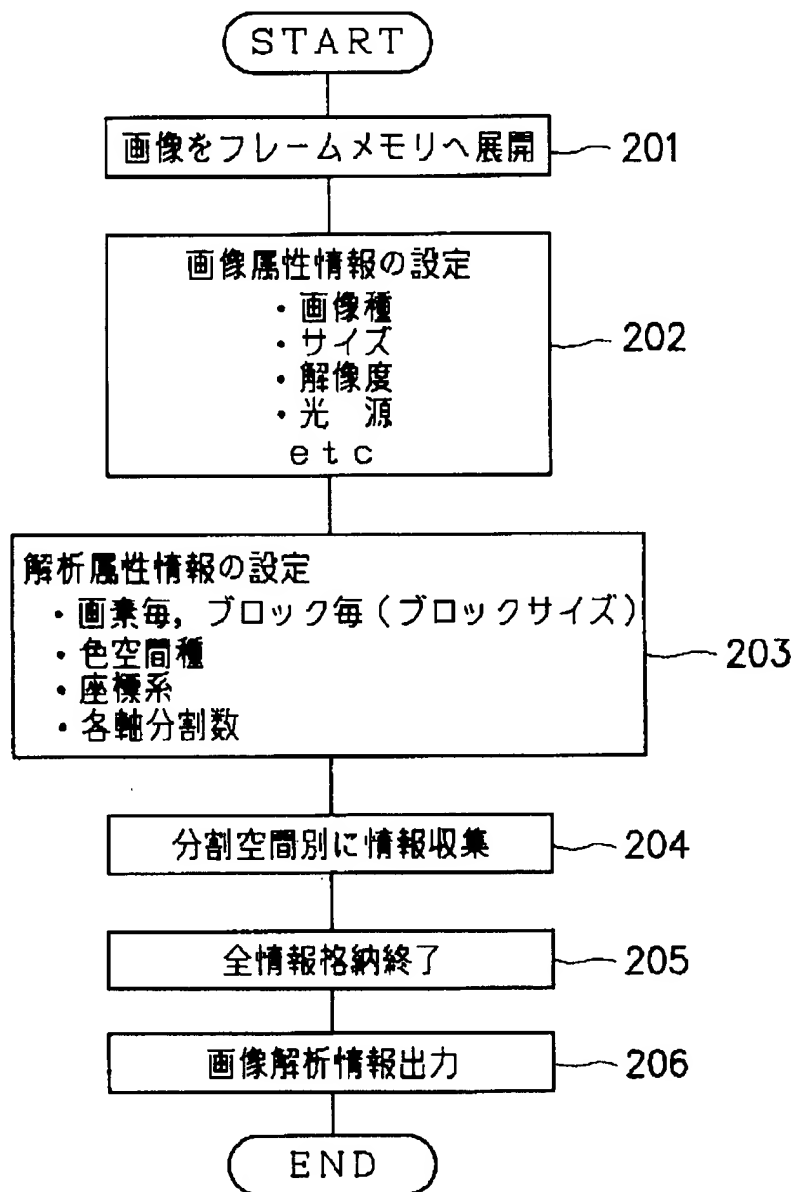
[Drawing 8]



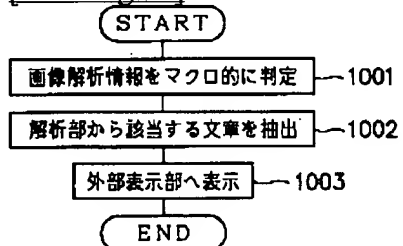
[Drawing 9]



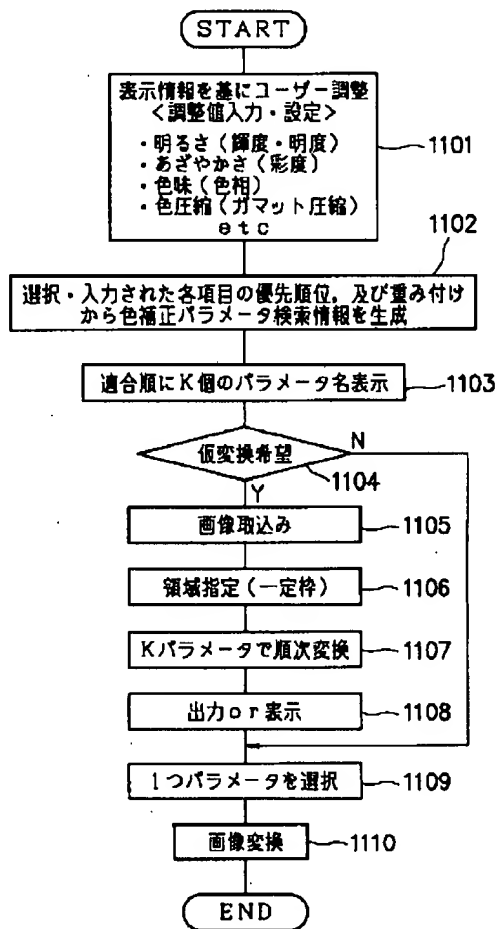
[Drawing 2]



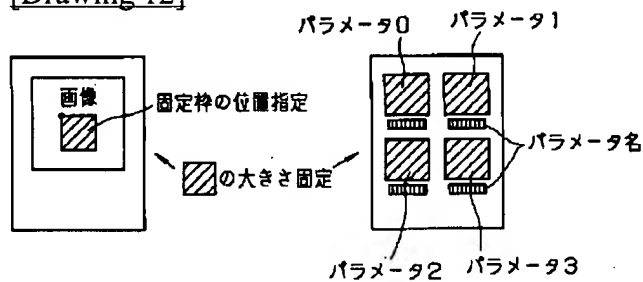
[Drawing 10]



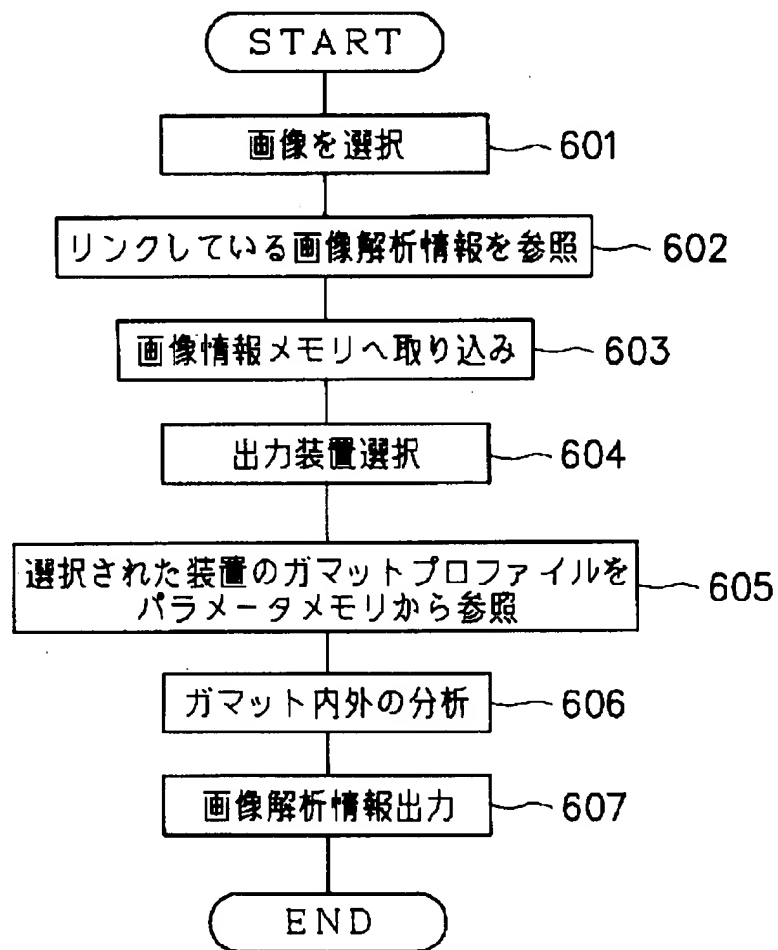
[Drawing 11]



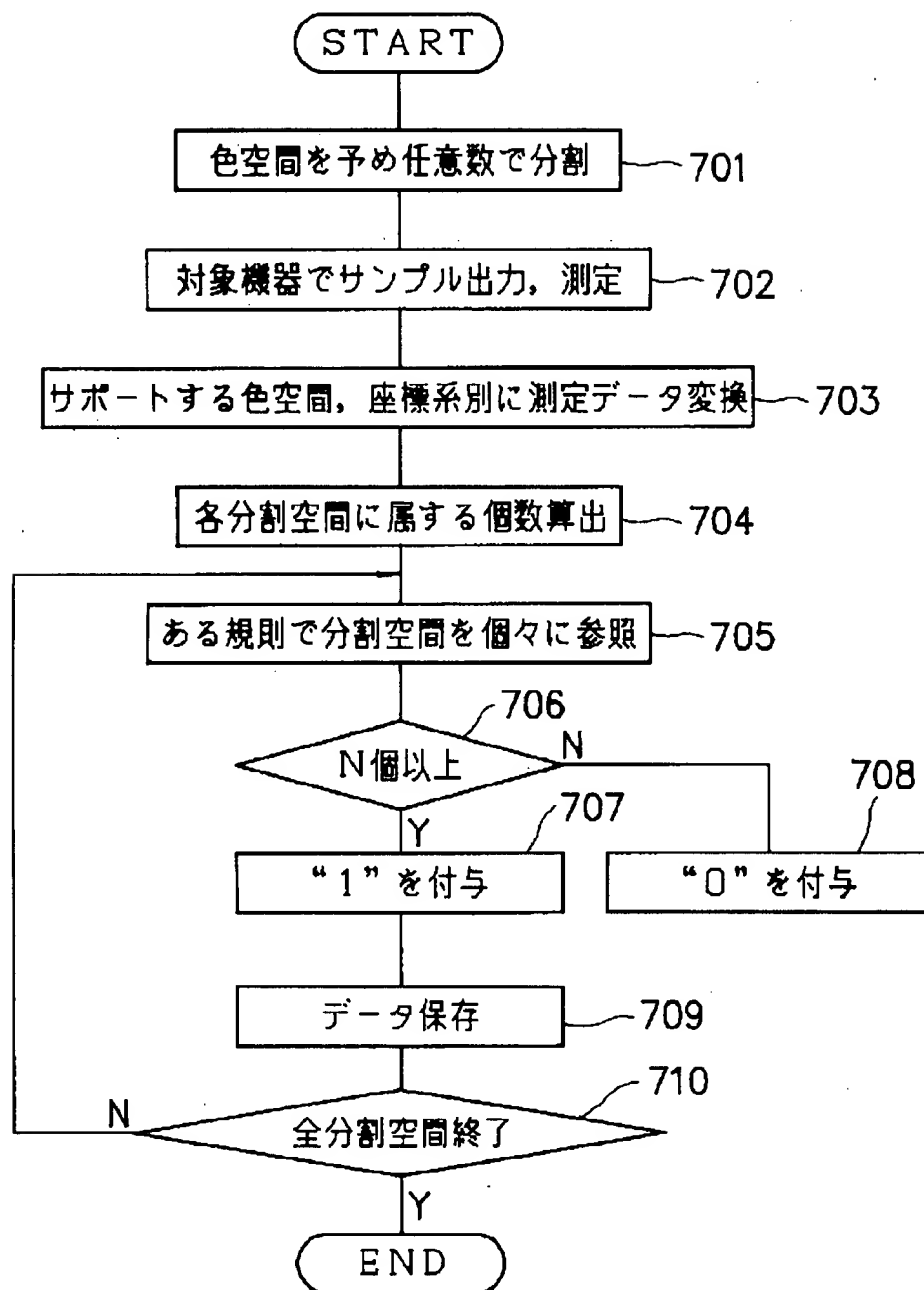
[Drawing 12]



[Drawing 6]



[Drawing 7]



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